THE

Journal of the Society of Arts,

AND OF

THE INSTITUTIONS IN UNION.

111TH SESSION.] FRIDAY, APRIL 21, 1865. [No. 648. VOL. XIII.

TABLE OF CONTENTS.

Announcements by the Council.

ORDINARY MEETINGS.

Wednesday Evenings at 8 o'clock.

APRIL 26.—"On the Wear and Tear of Steam-Boilers." By F. A. PAGET, Esq.

MAY 3.—"On Colonization; its Aspects and Results." By WILLIAM STONES, Esq.

CANTOR LECTURES.

The Third Course for the present Session, consisting of six Lectures, "On Some of the Most important Chemical Discoveries made within the last Two Years," by Dr. F. CRACE CALVERT, F.R.S., F.C.S. (Corresponding Member of the Royal Academy of Turin; of the Société Industrielle de Mulhouse; of the Société Impériale de Pharmacie de Paris, &c.), is now being delivered on Tuesday evenings, at Eight o'clock, as follows:—

APRIL 25TH.—LECTURE 3.—On the Discoveries in Agricultural Chemistry.

MAY 2ND.—LECTURE 4.—On the Discoveries in Physiological Chemistry.

MAY 9TH.—LECTURE 5.—On the Discoveries in the Chemistry of Rocks and Minerals.

MAY 16TH.—LECTURE 6.—On the Discoveries in the Chemistry of Metals and Alloys.

These Lectures are free to Members (without ticket), and every Member has the privilege of admitting ONE Friend to each Lecture.

INSTITUTION.

The following Institution has been received into Union since the last announcement:—

St. Helen's (Lancashire) Mechanics' Institution.

Proceedings of the Society.

NINETEENTH ORDINARY MEETING.

Wednesday, April 19, 1865; Professor Robert Bentley, Member of Council, in the chair.

The following candidates were proposed for election as members of the Society:—

Balfern, John Edward, 6, The Lawn, Shepherds'-bush, W.
Bedder, William, Saltash, Cornwall.
Boroschitzky, J. F., 32, Tavistock-place, W.C.
Botly, William, Salisbury Villa, Upper Norwood, S.
Buckley, R. S., Mossley, by Manchester.
Clever, Joseph, 7, Coleman-street, E.C.
Cozens, Samuel E., Phœnix Wharf, Southwark, S.E.
Davison, Thomas Langmore, 2, Lavender-terrace, Lavender-hill, S.W.
Edwards, Samuel, 13, Limes-grove, Lewisham, S.E.
Green, John, 2, Gloucester-place, Lower Tulse-hill, S.
Hawke, John, 3, Brockley-villas, Brockley-road, Newcross, S.E.
McClellan, Samuel, 7, Cambridge-terrace, Upper Lewisham-road, S.E.
Shanks, James, St. Helen's, Lancashire.
Skelton, John, jun., M.D., 105, Great Russell-street, W.C.
Taplin, Thomas, 14, St. James's-square, S.W.
Westhead, Albert, 20, George-street, Hanover-square, W.
Westhead, Edwd. S., 20, George-street, Hanover-sq., W.
Wilkinson, T. L., 1, York-villas, Sydenham-park, S.E.
Wynne, F. Osborne, Archcliffe-street, Dover.

The following candidates were balloted for and duly elected members of the Society:—

Austin, Charles E., 7, Broad-sanctuary, S.W.
Bradley, E. B., 1, Church-meadows, Sydenham, S.E.
Brown, George, Bruckwood-house, Croydon, S.
Buckney, Thomas, 12, Brunswick-square, Camberwell, S.
Canning, L., Abbey-wood, S.E.
Chambers, W. Oldham, Lowestoft.
Cooke, Rev. John Hunt, Elm-grove, Southsea.
Costeker, John, St. John's-hill, Wandsworth, S.W.
DaSilva, Johnson, Burntwood, Wandsworth-common, S.W.
Laslett, Thomas, Devon-house, Maryon-road, Charlton, S.E.
Lewin, William Henry, 135, Southampton-street, Camberwell, S.
Lloyd, Percy, Ash-villa, Burnt-ash-lane, Lee, S.E.
Lucas, Charles, 9, Louvaine-road, St. John's-hill, Wandsworth-common, S.W.
Massey, Hugh H., 33, Camberwell-green, S.
McArthur, Alexander, Raleigh-hall, Brixton-rise, S.
McEwan, James, 38, Cannon-street, E.C.
Nagle, Rev. W., 1, Blackheath-villas, Blackheath, S.E.
Parker, Thomas, 10, Brunswick-square, Camberwell, S.

The Paper read was—

ON THE PRESERVATION OF NATURAL HISTORY SPECIMENS FOR MUSEUM PURPOSES.

By B. Waterhouse Hawkins, Esq., F.G.S.

Museums have during the last 25 years become so important an element of civilization and education that they form a subject for discussion quite within the true province of the Society of Arts, and the first question I would suggest is—Do the natural history specimens in their present state fulfil their purpose of teaching, and of assisting the public to appreciate the advantages of a knowledge of natural history in any proportion to the vast cost of their collection and preservation?

The late Prof. Edward Forbes, in a valuable pamphlet on the uses of museums, says—"It is to the development of provincial museums that we must look in future for the extension of intellectual pursuits throughout the land." He then goes on to say, "When a naturalist goes from one country to another his first inquiry is for local collections. He is anxious to see authentic and full cabinets of the productions of the region he is visiting, and, if possible, to study them apart and not mingled with general or miscellaneous collections."

"For general affinities of objects that concern the whole world he seeks the great national collections, such as the British Museum, the Jardin des Plantes, and the Royal Museums of Berlin and Vienna, but that which relates to the particular locality he is endeavouring to become acquainted with, he expects to find either in a special department of the National Museum or in a separate establishment, the purpose of which is, in a scientific sense, patriotic and limited. In like manner, when the inquirer goes from one province to another he seeks first for local collections. In almost every town of any size or consequence he finds a public museum, but how seldom does he find any part of that museum devoted to the illustration of the productions of the district. The very feature which of all others would give interest and value to the collection, which would render it most useful for teaching purposes, has in most instances been omitted or so treated as to be altogether useless."

The public attention is now so much occupied with fish culture, not merely in the natural history sense, but also for economic purposes, as an article of food, and of commerce, and, therefore, legitimately within the scope of the direct action of the Society of Arts, that I need not give any other reason for commencing with this portion of my subject—the preservation of fish specimens.

The animal kingdom is divided into two great classes, the invertebrate, comprising the molluscs, the radiata, and articulata, of which I do not intend to speak—and the vertebrata, commonly known as birds, beasts, and fishes, which will form the subject of my remarks. This is, however, not a lecture on natural history, and I need not, therefore, enter into a description of the construction of the vertebrata, except to point out the fact that they have bony frames, to which muscles and tendons are attached.

Anglers and others interested in fish have often applied to our museums to see a complete collection of preserved specimens, but even at the British Museum, which is first in cost to the nation, first in size, and first in the vastness of the number of specimens it contains, such a collection of fish is not to be seen by the public. There are two modes of preserving fish: in spirit in bottles, and by dried skins fastened to a slab, or the whole stuffed in the true sense of the word; to which, colour, varnish, and glass eyes are added to complete the life-like aspect of the "fish out of water." Neither of these processes gives much idea of the appearance of the fish while living, and specimens thus preserved are not of so much use in a natural history point of view as a skeleton of the fish would be.

In the spirit bottle the whole of the fish is preserved; but this method has many disadvantages, which render it useless as regards the general public. What is required for them is a collection in which they can, at a glance, see the various differences between herring and pilchard, char and salmon, &c., and become acquainted with the modifications of form peculiar to the various kinds of fish.

One disadvantage is that the convexity of the sides of the spirit bottles deforms the objects seen through them, so that specimens preserved in this manner are only of use to the naturalist, who removes them from the bottles for the purpose of minute examination. To obviate this I propose that flat-sided glass cases or boxes should be used. Experiments were at one time made with flat sided glass cases at the Museum of the College of Surgeons, and at the British Museum, but these failed to be satisfactory; the fluid used was Goadby's solution (spirit being then too expensive even for our national collection), which expands with every variation of temperature, and it was found impracticable to seal the cases so hermetically as to prevent the solution from oozing through the crevices, and not only producing an unsightly appearance and destroying other specimens, but also admitting the air to the specimens in the case.

I have lately seen a slate frame, of a very simple construction, invented by a talented engineer, which is held together by iron bolts, in the same manner as a slate cistern, and which would, when fitted with plate glass sides, form a hermetically sealed case, in which the specimens of fish could be admirably displayed. These cases could be erected as a double screen, each being of about 9 inches, or the whole 18 inches in width, just wide enough to contain the body of the fish, and thus occupying a smaller amount of space, and giving a better view of the specimens than has yet been afforded by any other method. The specimens in bottles would still be retained for the use of the naturalist, and thus both requirements, the instruction of the general public and the inquiries of the scientific man, would be satisfactorily met. The remarks and suggestions which I have made with reference to fish apply equally to all other animals living under water and to reptiles.

Of all the classes of animal preserved in museums, the most successful, or rather the least objectionable in appearance, have always been the birds. The exact arrangement of the feathers of birds preserves the natural appearance, even if the skin be supported merely by a wire frame; but such specimens generate the destructive moth, to the detriment of the rest of the museum collection. This modification of my praise of preserved birds, must not be applied to the specimens prepared by Mr. Gould, Mr. John Hancock, or Mr. Charles Waterton, who possess no ordinary amount of artistic power as well as being eminent naturalists. In the Great Exhibition of 1851 a large field was opened to the taxidermist. In the Sardinian department there was "a remarkable specimen. It exhibited to perfection the art of representing the living animal, not only in its general form and character, but marking also the fine and delicate undulations of the flesh and muscles, and all the anatomical details which are externally traceable. The difficulty of effecting this is so great, that generally it is scarcely attempted, but in this instance the artist had been most successful. The process adopted by Sig. Comba, the exhibitor of this specimen, has been that of modelling the animal in clay, and from that model forming a mould. This mould enabled him to construct a figure of a material resembling papier-maché, retaining all the fidelity of the original model. Upon this figure the skin was stretched." Besides this artistic specimen, which obtained a prize medal, there was a collection exhibited in 1851 by Ploucquet, of Wurtemburg, consisting of a "series of scenes taken from Kaulbach's illustrations of the well-known German story of 'Reynard the Fox,' and executed with great skill, expression being thrown not only into the attitudes, but even into the countenances of the animals." The skins of some of the larger specimens exhi-

bited by M. Ploucquet were stretched over plaster models. Mr. Bartlett's specimens of birds obtained a prize medal in 1851, as also those exhibited in 1862 by him and his pupil, Mr. F. W. Wilson. Mr. John Hancock exhibited several single specimens and groups of birds and animals in 1851 which were "most truthful as to the representation of the habits and appearance of those creatures, and in every respect of the highest merit," and obtained a prize medal.

We have seen, then, that papier maché was adopted for that admirable model of the elk, from Turin, sent to the Exhibition of 1851, by Sig. Combà, which so justly received the medal. I have a vivid recollection of the beauty of that work, and am confident that the process by which it was produced might be safely adopted for all the models that may be required henceforth in our museums; indeed, I can state that successful experiments, in the use of papier maché, have been made by Mr. Bartlett's pupil, Mr. Wilson, at the Crystal Palace, the lightness and plastic nature of the material affording many facilities for the reproduction of the true form. Its cleanliness also adds much to its value, and the facilities for attaching the skin to the concavities by means of any of the cold liquid glues now in use, render the paper model the most hopeful means for the improvement of taxidermy that has yet been suggested. In the large group of stag and dogs, exhibited in 1851, and afterwards in the possession of the Crystal Palace Company, some of the skins were stretched over plaster of Paris casts, taken from the body of the animal immediately after the removal of the skin, but this material is too heavy and brittle for general use.

If, then, the majority of our museum specimens are not at present good, how can they be made better for the future? The preservation of animal forms is one of the most ancient arts still practised. Its most primitive form was the embalming of the dead bodies without removing the internal parts. The Greeks and Romans adopted the still more crude method of dipping the body in melted wax, which disguised the form. These preparations were made in Egypt, Greece, and Rome by the priests who collected them in the temples, but the idea of a museum of natural history originated in Italy, and it was the collection of an Italian amateur of this science, which, after several changes of hands, formed the nucleus of our British Museum. Though to the question, "What's in a name," there is a stereotyped answer, about a rose by any other name, &c., I believe that the first step towards improving the character of our museum specimens would be for the taxidermist to recast his name, and drop the title of "stuffer," "bird stuffer," and "beast stuffer," which suggests only a kind of natural history upholstery, little above the stuffing of a chair cushion. If he adopted some more elevated title, a higher class of work would be expected of him, his specimens would be subjected to artistic criticism, and a higher price would be paid for them; we should thus obtain ten good well preserved specimens of typical natural forms for every twenty or thirty of the ill-looking grotesques that are now so closely packed in the costly plate-glass cases of the British and other Museums.

By "well-preserved specimens" should be understood well modelled restorations of the animal's real form as in life, in a quiet attitude, at which the spectator could gaze contentedly for some minutes without that feeling of impatience for the creature to move which is excited by beholding an animal set up in the action of a spring or leap, which in life it could only maintain for a moment of time.

The production of well-preserved specimens of this standard is not so easy a task as may be supposed by the inexperienced spectator. It is easy to condemn a stuffed animal as unlike the living thing, while others suppose that it cannot be wrong because it is the thing itself. The actual skin (say they) and the greater part of the bones, are there, and, consequently, it only requires a little tow or other yielding material to be put between the bones and the skin to replace the flesh, the size of the skin being the guage or measure of the quantity. The skin is carefully and closely sewed up when full. This is the operation of stuffing, as it has been practised for many years.

The difficulties which the stuffer has to contend with are tolerably evident in specimens now exhibited. These skins of deer, antelopes, and the wild ass from Persia are a very fair average of the state in which the best skins are received from abroad—hard, shrunk in every direction, contradictory of the original form of the animal, sometimes preserved by applying turmeric, sometimes tanned, yet stiff and unmanageable, like some of the other specimens present. The stuffer has to cleanse and soften the skin as the preliminary step to his future operations; then, having made out the species or its affinities, he has to make his measurements very carefully, with considerable deductions and allowances for the stretching of the skin in the direction in which it may have been hastily pulled from the body of the animal; this hasty method of skinning the animal has generally the effect of elongating the skin in one direction, viz., the length of the animal, while of course the width or circumference of the body is disproportionately reduced, as the exhibited examples will demonstrate. It will therefore be seen, that the stuffer has to remedy deformities before he can construct the hard frame work that is to unite with the bones already there, being left in the skin, as the thigh, the tibia, and tarsal, with the metatarsals that constitute the bones of the foot, or he may have to make an entire frame or substitute for the skeleton, upon which he must place the rest of his model, having the numerous convexities and concavities that shall faithfully represent the bulk of the muscles and sinews covering the bones of the animal as he appeared in life. This is but preliminary; he has then to make the skin fit his model in every part, or perhaps it would be more correct to say that he has to make his model fit every part of the skin, in spite of the deformities contracted in the first act of skinning, whereby it has been both stretched and shrunk, while the latter effect has been increased to an almost unlimited extent, by the drying process that commenced suddenly in the tropics, and has been continued during a long voyage.

The eye was formerly treated as a mere glass button, without any regard whatever to true imitation of that organ itself, either in colour, form, or expression. In 1848 I was induced to take up the subject, and at my suggestion eyes of an improved character were formed of glass, which enabled the artist, by means of painting and the use of various coloured silks and a backing of velvet, to produce an artificial eye which should accurately imitate the real eye of the animal. These eyes are now getting into general use, for I did not patent the invention, and they are very cheap. Formerly the only good artificial eyes were to be had in Belgium, and were very dear, costing frequently as much as £2 for a single pair of eyes, and even then it was not in the power of the stuffer to adapt them specially to the subject in hand.

With such materials and opposing difficulties, I maintain that the stuffer of birds and beasts ought to be something more than a stuffer, for he has a more arduous task than the sculptors' modeller, who imitates the external form of a living animal, with more or less knowledge of the internal anatomy or framework. If, then, the stuffer's work is to be expected to bear comparison with the work of the artist modeller, the many greater disadvantages that the stuffer has to contend with, and the ingenuity he must possess to conquer them, should be taken into account, and, as greater skill and better education are required, a higher remuneration and rank should be accorded to the artistic workman who shall at all times prove himself competent to adapt the distorted skin to a correct artificial model, possessing the true form of the animal so preserved. Whenever this style of preserving specimens of natural

history can be accomplished for museum purposes we may then contentedly forego the motley crowd that now fills the costly glass cases at our national museum and unprofitably occupies the valuable space of those large rooms, pronounced insufficient for the continuous influx of stuffed specimens, but which might be large enough for well-selected typical forms, having the real skin put upon a life-like model, side by side with a type skeleton of the group, from which the artist, sculptor, or painter could derive instruction sufficient to qualify him to continue his studies from the living animals belonging to the Zoological Society, who, in their liberal wisdom, have always allowed artists free access to their collection. Then we should have our art-students in possession of the same facilities for the study of animal forms as are possessed by the student of high art. The museums containing true models of various animals, in lieu of the present style of stuffed specimens, would be to the animal painter the equivalent of the casts from the antique, to educate him gradually to take advantage of the animal life academy always to be found at the Zoological Gardens.

DISCUSSION.

Mr. G. F. Wilson, F.R.S., said Mr. Hawkins, in his very interesting paper, had spoken of the preservation of specimens of fish. Ten years ago he (Mr. Wilson) tried a great many experiments with what was then a new medium, viz., glycerine. He tried the effect of this on a large lake trout, which he caught in Scotland, and enveloped in a cloth saturated with glycerine, in which it was kept in a good state of preservation. It was afterwards presented to Prof. Owen, and placed among the objects of this character in the museum of the College of Surgeons. He had understood that the same medium had been used by Dr. Carpenter for the preservation of star-fish. He should be glad to hear Mr. Hawkins's opinion as to the advantages or disadvantages of the use of glycerine for the preservation of this class of object.

Mr. George White said the subject which had been brought before them in so interesting a manner naturally suggested the inquiry how museums might be made educationally valuable. The wants of the scientific inquirer and of the artist had been more or less considered in our museums of natural history; but there was one point to which the prominence it deserved had not been given—that was the general educational uses of these establishments. They had heard this evening that the British Museum was not so largely visited by the public as was formerly the case. He was not at all surprised at that fact. As the natural history specimens there got dingy and dusty, and as people came to know more about them, and as, moreover, they could often see better specimens in other museums, it was not surprising that our great national collection was not attended by such large numbers as was the case some years ago. Mr. Hawkins had made the remark that there was no class of specimen in which they had succeeded so well as in birds; with great deference he thought they were amongst the most unsuccessful portions of the museum. When a boy he (Mr. White), like most others in the country, amused himself a great deal in searching the hedge-rows for birds' nests, and acquired a large collection of eggs; he also practised to some extent as an amateur taxidermist, and it was a great prize to him when he alighted upon a book on that subject. He then gratified his tastes by preparing specimens of the birds of the locality in which he resided, and it was not till he was a young man that he visited the British Museum. When he first went there he must say he was disappointed with a great number of things he saw. He was recommended to go again, and to confine his attention to one particular class of object to which his tastes inclined. At that time there were scarcely any birds' eggs in the museum, and with regard to the birds themselves, he put the question to himself, "Do all birds sit upon sticks in one unvarying attitude? and are they all constantly sitting with their wings closed, and their bills pointed in one direction?" He was surprised to see whole regiments of water wagtails, tom-tits, and yellow-hammers, set in rows above each other, all exactly alike; and he could learn no more from looking at twenty or thirty than he could from looking at one. Then he was struck with the thought, "How little all this exhibition teaches me." At the time he spoke of there was no classification of the birds, and the labelling was extremely imperfect. An alteration had taken place in that respect, but very great improvements were still required. Instead of having thousands of birds stuffed, as a cook might do for roasting, he would have them in fewer numbers, well classified and labelled, and placed in natural postures. These might be varied to a great extent. For instance, the birds might be represented as flying to and from their nests, giving food to their young, &c. He had seen nothing which had given him satisfaction in this respect since the Exhibition of 1851, and in comparison with 1862 he decidedly gave the palm to 1851. The expression and attitudes of the birds and animals shown there were Landseer-like, and all the features of life were admirably preserved. On this subject he believed a great work might be undertaken by this Society by the exercise of its influence to render museums of national history more educationally interesting and entertaining to the masses who visited them.

Mr. J. Beavington Atkinson had not intended to make any remarks on the subject treated by Mr. Hawkins in his most interesting and instructive paper, but he had been induced to rise because a point had been raised in it which had involved a subject in which he had long felt special interest—that of art and the connection which existed between science and art. The points to which they had had their attention directed were of great practical importance, and the few remarks he should make would have relation to that part of the subject with which he was more particularly concerned. It was related in the life of Haydon, the painter, that he and his pupil, Sir Edwin Landseer, made a careful dissection of a lion, as a necessary part of the education of an artist, showing, as had been pointed out by Mr. Hawkins, how strongly these distinguished men felt that a thoroughly educated artist had something more to do than to attend merely to the gloss on the skin or the texture of the hair, and must necessarily study the anatomy of the animals which he painted. Some of the marbles in the Vatican afforded the strongest evidence that artists in ancient times paid attention not merely to the superficial texture of the skin, but to the accurate configuration of the body of the animal represented. Coming down to the present time, he might call attention to a recent work on the camel,* by Elijah Walton, which was the result of really diligent and careful study of the animal, and the value of which to artists and students of natural history could hardly be overrated. The artistic advantages of really correct drawings of this animal had been recognised by artists and critics. Many of the drawings of the late distinguished artist David Roberts possessed, no doubt, very high merit, but when he attempted the delineation of the camel, he failed to show that accurate knowledge of the anatomy of the animal which was manifest in the works of another great artist, Lewis. The art value of the drawings of the latter was immeasurably greater, simply because he understood the structure of the camel. He might further refer to a painting which they would see at the forthcoming exhibition of the Royal Academy, by Frederick Goodall, R.A., the subject being, "A Flood upon the Nile." In that painting they would see an accurate delineation of the camel—a most difficult animal to draw, because, although pronounced in its articulations, yet in its movements most loose

* "The Camel; its Anatomy, Proportions and Paces." By Elijah Walton. (*Day and Son.*)

and undecided. There was this obvious connection between the study of anatomy and art, so that a picture might in fact be looked upon as a work of science as well as of art. He thought what they had heard this evening enforced a truth which they were more and more ready to admit—that the highest science was the best and truest art; and that in accuracy of detail, which in previous years had been considered to belong only to the man of science, would the artist find his highest beauty.

The Chairman said it was now his pleasing duty to propose that the thanks of the meeting be given to Mr. Hawkins for his paper, which he had no hesitation in characterising as one most interesting and instructive, and he trusted it would lead to valuable results. Having been a pupil of the late Professor Forbes, he well recollected his crushing denunciations of the different museums he found in passing through the country, and his regret that these local establishments could not be made strictly educational, more particularly as illustrating the natural history of the locality, a view advocated by Mr. Hawkins this evening. No doubt the great difficulty in all museums had been the fact of the inartistic way in which the natural history specimens had been preserved, in no degree resembling the animal itself, or the form of any living object whatever; but if these objects were placed before them in a really satisfactory form, as might undoubtedly be done, though it would require a great deal of time and skill to do it, the museums would be more frequented than they were at present, and would be more valuable in an educational point of view. With regard to the statement that the numbers visiting the British Museum had very materially diminished, it was to be borne in mind that some few years ago it was the only exhibition of its kind in the country; whereas now there were the collections at South Kensington, the Crystal Palace, and elsewhere. Moreover, when they saw such inartistic specimens as that exhibited this evening as a fair type of what was to be met with in the national collection of zoology, it was not to be wondered at that, with the improved taste of the age, such a collection should lose its attractions. He regretted that the subject before them was one on which he had but little practical knowledge, his own department being more especially the vegetable kingdom. Hitherto the miserable dried specimens of plants usually seen were of little value to the scientific man; to those who desired to know what the plant really was they conveyed no idea. He was happy to find that a great improvement in this respect was to be looked for, owing to the modifications introduced by Mr. Ward, the well-known inventor of the Wardian case. His idea was to arrange the entire vegetation of a particular mountain or district in such a manner as to be valuable to the man of science as well as gratifying to the general visitor. Specimens either of the animal or vegetable kingdom, had no value unless they gave some correct notion of what the objects represented really were in their natural state. He should have been glad to have heard some further discussion with respect to preservative substances. He agreed with Mr. Hawkins that Goadby's solution was not satisfactory, and the only reason it was formerly used was on account of the great expense of spirits. He believed methylated spirit, with three parts of water, was the best liquid that could be employed; while for vegetables and plants, salt and water, vinegar and water, or dilute pyroligneous acid, answered well, one special advantage being that they preserved the colour. He was sure the meeting would unanimously agree that their thanks were eminently due

Mr. Hawkins for his paper, and for the peculiarly clear and artistic manner in which he had illustrated his subject on the black canvas.

The vote of thanks having been passed,

Mr. Waterhouse Hawkins, in acknowledging the compliment, expressed his regret that in our National Museum the intending emigrant and colonist sought in vain for properly classified specimens of the animals, birds, &c., to be found in the new country to which he was going. He thought the Society might assist in obtaining something like a geographical arrangement of this kind, showing, even if only on a small scale, the animals of New Zealand, Australia, &c. Such an exhibition would be of great value to those going out as emigrants or as collectors, and would prevent the latter sending home useless things for want of that knowledge which might be obtained in a well-organised museum.

Mr. Hawkins illustrated the various points of his paper by sketches in chalk on the black board, and exhibited a collection of stuffed animals showing defective as well as meritorious work of this kind.

DUBLIN INTERNATIONAL EXHIBITION.

The interior of the building now begins to present a very busy aspect, the works of the contractor in painting, decorating, glazing, &c., being completed, and gas-pipes having been laid throughout the building; the business of the exhibitors has begun in earnest, in fitting up cases and arranging counters, goods, &c. The court in the Indian gallery has been railed in preparatory to the work of fixing cases and opening packages. In the Colonial gallery the courts and counters are all up, and we see packages from Canada, Nova Scotia, Mauritius, Natal, Jamaica, West Africa, Falkland Isles, Ceylon, Queensland, Siam, &c., waiting to be opened.

Among the commissioners, &c., already present or on their way are Mr. James Morris, representing Mauritius; Dr. Forbes Watson, India; Mr. Tyndal Bright, Victoria; Rev. Dr. Honeyman, Nova Scotia; Mr. A. Ferro, Malta; and Mr. W. Hewitt, China and Japan.

The preparations for the due reception of His Royal Highness the Prince of Wales, who will stay with Lord Wodehouse, are progressing rapidly. The musical performances at the opening on the 9th of May, with nearly 1,000 voices, will be very effective. A grand ball will be held in the building on the 12th, to which only season-ticket holders and members of the Musical Society with which it originates will be admitted. The Grand Lodge of Ireland also proposes to give a masonic ball if the Prince remains long enough. The grounds of the Palace are already beginning to wear a more finished aspect, consequent on the fine weather; and conservatories, blocks of coals, obelisks, fountains, and other objects for which room cannot be found within the building are to be accommodated there.

Work has commenced in the foreign courts. M. Corbière, the representative for France, has already got his court in preparation in the centre of the building. Germany, Italy, and other states are also at work, their goods having arrived. The picture galleries begin to wear an attractive aspect.

The Queen of Spain has named six gentlemen as Royal Commissioners for that country; and about fifty pictures from the National Gallery at Madrid are on their way to Dublin.

It has been determined that the jurors for the several classes shall be selected by the Executive Committee from the recommendations of the several committees and representatives of foreign countries, and in accordance with the wishes of the exhibitors. This mode of selection has been considered preferable to the direct election by the exhibitors, of whom it is not to be expected that a large proportion will be present in Dublin at one time; the difficulty of collecting their suffrages, and of obtaining anything like agreement among them, where there was no opportunity for previous meeting or consultation, was sufficiently apparent in 1862; and the unsatisfactory results of the system then adopted have induced the Committee to assume the responsibility of nominating the jurors, taking care to consult the wishes of the exhibitors, and to seek for the assistance of the most competent men in

every department of science and manufactures, both at home and abroad. With this view the several foreign committees have been requested to submit the names of such of their countrymen as they would recommend for the office, and who are likely to visit Dublin for the purpose of performing the duty. The design for the medal is by the celebrated medallist, William Geefs, of Brussels. It is a handsome composition, representing the Spirit of Progress in Arts and Manufactures enriching Ireland from a full cornucopia, while a view of the building in the background and various emblems of industry mark the year as an epoch in the improvement of the country.

The leading railways have already conceded a reduction of 25 per cent. on the ordinary return fares, and it is hoped will yet run cheap excursion trains to induce numbers to visit the Exhibition and the lovely lake scenery of Ireland in the autumn. The city is painting and putting on its brightest aspect for the occasion, and a register of the charges for lodging and hotel accommodation has been established at the inquiry office in the building. The steam packet companies have reduced the charges considerably on goods intended for the Exhibition. The Royal Dublin Society has conceded the use of its premises for such agricultural implements and goods as cannot be accommodated in the Exhibition building; and altogether the arrangements thus far promise a very great success for this second International Exhibition originated in Ireland.

THE SEWAGE OF TOWNS.

The Sewage Commission, consisting of the Earl of Essex, Professor Way, Messrs. Bobert Rawlinson, J. Bennet Lawes, and John Simon, have just issued their report, which states that since the date of the last report (August, 1861) the commissioners have, through a committee, consisting of Mr. Lawes and Professor Way, continued at Rugby the experiments which were undertaken in 1861 on the application of sewage to land. These experiments have not been confined to the application of sewage in different quantities to land, but have extended to the consumption, by cattle, of the produce so obtained, and to the production of meat and milk, and have been accompanied by a careful record of the quantities and market value of the products, and by numerous analyses of the sewage before and after irrigation, as also of the grass and of the milk. The general conclusions are summed up as follows:—1. The right way to dispose of town sewage is to apply it continuously to land, and it is only by such application that the pollution of rivers can be avoided. 2. The financial results of a continuous application of sewage to land differ under different local circumstances; first, because in some places irrigation can be effected by gravity, while in other places more or less pumping must be employed; secondly, because heavy toils (which in given localities may alone be available for the purpose) are less fit than light soils for continuous irrigation by sewage. 3. Where local circumstances are favourable, and undue expenditure is avoided, towns may derive profit, more or less considerable, from applying their sewage in agriculture. Under opposite circumstances, there may not be a balance of profit; but even in such cases a rate in aid, required to cover any loss, need not be of a large amount. On the basis of the above conclusions, the Commissioners submit that the following two principles are established for legislative application:—First, that wherever rivers are polluted by a discharge of town sewage into them, the towns may reasonably be required to desist from causing that public nuisance. Second, that where town populations are injured or endangered in health by a retention of cesspool matter among them, the towns may reasonably be required to provide a system of sewers for its removal. And should the law, as it stands, be found insufficient to enable towns to take land for sewage application, it would, in the opinion of the Commission, be expedient that the legislature should give them powers for that purpose.

ON THE ACTION OF SEA WATER UPON CERTAIN METALS AND ALLOYS.

By F. Crace Calvert, Ph.D., F.R.S., F.C.S., &c., and Richard Johnson, F.C.S.

We were induced to examine the action exerted by sea water, in consequence of the rapid changes which have taken place of late years in naval architecture, and especially in the substitution of metals and alloys for wood, and because one of us is largely engaged in the manufacture of wire for submarine and other telegraphs, and, when spun into ropes, for ships' rigging.

To carry out the above views, we took 20 square centimetres of each metal, which we cleaned with great care and attention, in order that the action of the sea water might have its full effect; then two plates of each metal were placed in separate glass vessels, and immersed in equal volumes of sea water. After one month the plates were taken out, and any compounds that had adhered to the surface carefully removed; the plates were then dried and re-weighed, and the loss estimated. To render our results of more practical value, we have calculated the action of 100 litres of sea water upon one square metre of each metal, and the following are the amounts of metal dissolved:—

	Grammes.
Steel	29·16
Iron	27·37
Copper (best selected)	12·96
Copper (rough cake)	13·85
Zinc	5·66
Galvanised Iron (Johnson's process)	1·12
Block Tin	1·45
Stream Tin	1·45
Lead (virgin)	Trace
„ (common)	Trace

These results lead to the following conclusions:—

1. That steel is the metal which suffers most from the action of sea water.

2. That iron is most materially preserved from the action of sea water when coated with zinc, and, therefore, not only should iron exposed to the action of sea water be galvanised whenever this is practicable, but, in our opinion, it would amply repay shipbuilders to use galvanised iron as a substitute for that metal itself.

The above facts perfectly confirm those which we have already published in our paper, "On Galvanised Iron for Armour Plated Ships," in which it was shown, that when iron was in contact with oak they mutually acted upon each other, producing a rapid destruction of the two materials, whilst little or no action took place between galvanised iron and the wood.

3. The extraordinary resistance which lead offers to the action of sea water, naturally suggests its use as a preservative to iron vessels against the destructive action of that element; and although we are aware that pure lead is too soft to withstand the wear and tear which ships' bottoms are subjected to, still we think that an alloy of lead could be produced which would meet the requirements of shipbuilders.

Feeling that experiments made with a limited amount of sea water might not be a fair criterion of the action of the ocean upon metals, we repeated our experiments upon plates of 40 centimetres square, which were immersed for one month in the sea on the western coast (Fleetwood), taking the precaution that they should be constantly beneath the surface of the water, and suspended by flax rope attached to a wooden structure, to prevent any galvanic action taking place between the plates and the structure to which they were attached.

The following are the amounts of metals dissolved:—

	Grammes.
Steel	105·31
Iron	99·30
Copper (best selected)	29·72
Zinc	34·34
Galvanised Iron (Johnson's process)	14·42
Lead (virgin)	25·69
„ (common)	25·85

The foregoing figures suggest the following remarks:—

That the action has been much more intense, in this instance, than when the metals were placed in a limited amount of water at the laboratory. These results are due probably to several causes acting at the same time, viz.:—that the metal was exposed to the constantly renewing surface of an active agent; and that there was also a considerable friction exerted on the surface of the plate by the constant motion of the water, there being at Fleetwood a powerful tide and rough seas. What substantiates this opinion is, that the lead plates undoubtedly lost the greater part of the weight, not by the solvent action of the sea water, but from particles of lead detached from them, in consequence of their coming in contact with sand and the wooden supports to which they were attached; but this cause of destruction having been observed with lead plates, it was afterwards carefully guarded against in the case of all the other metal plates.

We also deemed it desirable to examine the action of sea water on various brasses. We therefore immersed for one month plates of various alloys in that fluid, and proceeded to record our results:—

Action of 200 Litres of Sea Water upon One Square Metre Surface of the following Brasses:

Composition of the Brasses.		Quantity of Metals Dissolved. IRON.	COPPER.	ZINC.	TOTAL.
Pure Copper	50				
Pure Zinc	50				
	100	——	1·110	10·537	11·647
Commercial Brass:					
Copper	66·				
Zinc	32·5				
Iron and Lead	1·5				
	100	0·579	3·667	3·324	7·570
Muntz Metal (Sheet):					
Copper	70·				
Zinc	29·2				
Iron and Lead	0·8				
	100·0	0·438	4·226	2·721	7·385
Muntz Metal (Bars):					
Copper	62				
Zinc	37				
Lead and Iron	1				
	100·0	0·501	2·697	3·493	6·691
Prepared Brass:					
Copper	50				
Zinc	48				
Tin	2	TIN.			
	100	0·365	7·04	3·477	10·882

The above table shows how very differently sea water acts upon divers brasses and the influence exercised upon the copper and the zinc composing them, by the existence in them of a very small proportion of another metal; thus, in pure brass the zinc is most rapidly dissolved (which, *en passant*, is the contrary to what takes place in galvanised iron), whilst it acts as a preservative to the copper.

Tin, on the other hand, appears to preserve the zinc, but to assist the action of sea water upon the copper.

The great difference between the action of sea water upon pure copper and upon Muntz metal seems to us to be due not only to the fact that copper is alloyed to zinc, but to the small proportion of lead and iron which that alloy contains; and there can be no doubt that shipbuilders derive great benefit by using it for the keels of their vessels.

We were so surprised at the inaction of sea water upon lead that we were induced to compare its action with that of several distinct varieties of water, viz., Manchester Corporation water—well water—distilled water in contact with air—the same deprived of air—and the following are the amounts of metals dissolved by 200 litres of these waters upon one square metre of surface during eight weeks:—

	Grammes.
Manchester Corporation water	2·094
Well water	1·477
Distilled water (with air)	110·003
,, ,, (without air)	1·829
Sea water	0·038

These figures require no comment, as they confirm our previous result that sea water has no action on lead, except what arises from friction.

Fine Arts.

The Pourtales Sale.—This great sale, which commenced on the 6th of February, and occupied twenty-nine actual sale days, closed on the 4th instant. The interest created, and the prices obtained, have been enormous. The collection has remained unsold, in accordance with the will of the deceased Count de Pourtalès-Gorgier, for ten years since his death, and there is little doubt that this circumstance has enhanced the receipts by something like 50 per cent. The estimates of the experts, who in Paris fix an upset price at the auction, have been very generally surpassed, and the total amount of the sale falls little short of £150,000. The late Count bought carefully, and at a time when objects of art were low in price in France, and it is believed that the collection has sold for at least five or six times more than it cost. The following are amongst the most interesting of the three thousand and odd items:—*Pictures.*—Albertinelli, Holy Family, sold for a sum equal to £500. Antonello de Messine, pupil of Van Eyck, from whom he learned the art of painting in oil, Portrait of a Man, bearing date 1475, and being the only known work of this artist, purchased for the Louvre at £4,540. Giovanni Bellini, pupil of the preceding, Holy Family, £824. Angiolo Allori, called Il Bronzino, Portrait of a member of the Medici Family, £2,200. Carlo Dolci, Saint Catherine, £1,080; and Christ in Purgatory, bearing a standard, and giving his hand to Saint Thomas to kiss, picture that decorated the sacristy of a Florentine convent, £728. Francia, Madonna and Child, St. John and an Angel, £860; and a Holy Family, £560. Leonardo da Vinci, Madonna and Child, £3,340. Moroni (who died in 1578), Portrait of a bearded Man, £504. Palme the Elder, Holy Family, £408. Sebastian del Piombo, Portrait (supposed) of a Duc d'Urbin, £3,720. Paul Veronese, Portrait of his Daughter, £820. Philippe de Champaigne, Marriage of the Virgin, formerly the altar-piece of the Chapel of the Palais Royal, in Paris, a long picture, containing about twenty figures, purchased by the Marquis of Hertford for £1,740; Portrait of his Daughter, a Nun of Port Royal, £884. Francis Hals, Portrait of an Officer, also purchased by the same nobleman for £2,040. Rembrandt, Portrait of a Burgomaster, lately in the collection of Mr. Farrer, of London, £1,380; and Portrait of a Warrior, £1,080—two magnificent works purchased for the National Gallery of London. Rubens, beautiful small Portrait of a Noble, bought for the Louvre, £440. Murillo, The Triumph of the Eucharist, a large mystical composition, with many figures, also purchased for the Louvre, £2,700; a Madonna and Child, £720; and Saint Joseph walking with the Infant Jesus, £600. Velasquez, a Young

Warrior, wearing a black cuirass, lying dead in a cavern, known as the "Dead Roland"—a noble work, bought for the National Gallery, at £1,400. Bonnington, the Sea Coast at Low Water, £260. Boucher, a Poor Artist Working in his Garret, amid signs of poverty and confusion, £280. David, Portraits of Pius VII. and Cardinal Caprara, £712. Decamps, a Soldier of the Sultan's Guard, a very small but beautiful work, £320. Delaroche, Saint Cecilia, £840; Cardinal Richelieu, in his Barge on the Rhone, leading Cinq-Mars and De Thou to Execution; and its companion picture, Cardinal Mazarin on his Death-bed, the Court playing cards near it, and one of his nieces showing him her hand, sold together for £3,200; and the Temptation of Saint Anthony, £408. Greuze, Innocence, a young girl with a lamb in her arms, £4,008; and Portrait of a Young Girl, a small work, £208. Ingres, Raphael and the Fornarina, £380. Lancret, Women Bathing, £292. Lenain, a French artist, who died in 1648, Six Nobles of the time of Louis XIII. sitting round a table talking and smoking, £700. Claude Lorraine, Italian landscape, Sunrise, from the collection of Mr. William Smith, of London, £1,460. Meissonnier and Francas, figures by the former in a landscape by the latter, £500. Rosa Bonheur, Shepherd guarding sheep and goats, £364. Ary Scheffer, Young Mother, £260. Horace Vernet, Thamar and Inda, £1,408. *Drawings and Sketches.*—A sketch of the Adoration of the Shepherds, by Pinturicchio, called "Il Bernardino di Benedetto," a painter of the Ombrian school, who died in 1513, £200. Pen-and-ink drawing, by Albert Durer, in three parts, bearing date 1510, £180. Crayon drawing, by Prudhon—Helen and Paris reconciled by Venus—£196. *Antiquities.*—The celebrated vase in Oriental red porphyry, from the villa Albani, and known as the Vase of Pallas, £680. Colossal statue in marble of the Emperor Augustus, formerly in the possession of Cardinal Richelieu, purchased for the Berlin Gallery, at the price of £1,048. Statue of Cupid bending his Bow, an antique copy of a work supposed to be by Praxiteles, and of which a similar copy is to be seen in the British Museum, £340. Young Satyr and Panther, Greek, £612. Colossal head, called of Apollo, formerly in the Giustiniani Gallery, and one of the purest specimens of Greek art, purchased for the British Museum at £1,800. The painted Greek vases in this collection were, perhaps, on the whole, unrivalled. One of these, decorated with subjects belonging to the Eleusinian mysteries, fetched £100; and another, with episodes from the story of Theseus and Hippolyta, £404. *Antique Bronzes.*—Small statuette of Jupiter, found at Besançon, £320. Another of the same personage, seated, found in Hungary, £480. A diminutive figure of Apollo, but very celebrated on account of its antiquity, an inscription upon it carrying it back to the sixth century before the Christian era, £200. Small statuette of Minerva, in the finest style of Greek art, £768. Four pieces of armour, a casque, grieves, arm pieces, and buckler, found at Herculaneum, bought by Prince Napoleonfor £520. Small bust of a Roman, unknown, celebrated by Visconti, purchased for the Louvre at £182. Elegant tripod from the ruins of Mataponte, Berlin Gallery, £400. Large ornamental seat in bronze, from Rome, Louvre, £212. Fine bronze vase, from Locris, £280. Another, found in one of the tombs at Vulci, £360. Candelabrum, found with the same, £80. Lampadaire, a bronze pilaster with arms, supporting four small lamps of different forms, from Herculaneum, purchased for the Louvre at £116. *Terra Cotta.*—This portion of the collection contained some very remarkable examples. A small coloured statuette of a woman seated crossed-legged and arranging her hair, found in Athens, fetched the extraordinary sum of £100. Two small fragments of a bas-relief, £86.—A fine Greek cameo, with a single female figure, went for £108; a series of thirty intaglios in rock-crystal, by Valerio Belli, £520; and an ancient glass vase, found near Amiens, £84.—The *sculpture in ivory* was remarkably choice. A statuette of Hercules, supposed to be the work of John of Bologna, sold for £656; a small statuette of Venus, by F. Flamand, £236; a tankard, by the same, purchased by M. Thiers for £524; a circular bas-relief, with six figures of children, £284; another, Pan with a group of children, £212; portraits of Jacob Herbrot and Marina Krater, his wife, carved in wood, and bearing the date 1527, attributed to Albert Durer, fetched £240; and a medallion, also in wood, with the head of Ludovicus Dangerant, and the date 1529, £36. A bronze bust of Charles IX. of France, life-size, the work of the period, formerly in the collection of the Duc de Berry, sold for £1,800. *Porcelain and Faïence.*—This section presented instances as extraordinary as any of the others; a large *coupe* or tazza of Gubbio ware, sold for £136, and a round dish of the same for a like sum. A large dish of faïence d'Urbino, £65; and a vase of the same, £148; a small square of Faenza ware, with a subject after Albert Durer, £126; a large oval dish, by Bernard Palissy, £112; and a grand salt-cellar by the same, £202. But the gem of this portion of the sale was a vase of the so-called Henry II. ware, which was purchased by a private gentleman, M. Van Cuych, for £1,100.—The *Limoges* and other enamels were extremely fine and numerous. A beautiful covered cup, presented to Mary Stuart when she was affianced to Francis II., fetched £1,084; a round basin, *grisaille* enamel, £808; a large dish-tray in exquisite coloured enamels, subject, "The Egyptian Army Drowned in the Red Sea," by Jean Courtois (or Courteis), £1,200; a small ewer to match, £280; and an oval plateau by the same, *grisaille*, £560; a *coupe*, or large flat glass, of Venetian manufacture, of the fifteenth century, fetched £100; a vase in rock-crystal, a fine work of the sixteenth century, £460; three others, £200, £284, and £352 respectively; a jasper cup, £576; a knife and spoon in silver gilt, supposed to be the work of Benvenuto Cellini, £442; and, more wonderful than all, a pewter ewer and basin, ornamented with arabesques and medallions by François Briot, with his own portrait beneath the basin, was bought for £300. This rapid sketch of a few of the gems will give some idea of what was the Pourtalès collection, which the hammer of the auctioneer has now scattered over the face of the globe.

Photography on Painting Canvas.—Many attempts have been made to obtain a photographic groundwork for oil paintings, but heretofore without much success; it is said, however, that the Belgians have been more successful than their neighbours. The method adopted is, to use fine canvas, or silk, such as is employed for small and delicate works, simply to cover the surface with a preparation of collodion and chloride of silver, and to expose it and fix it in the ordinary manner just as in the case of paper. It is said that no difficulty whatever arises, provided that the collodion be well selected; if of a nature to dry hard and horny, it will fall from the canvas, and so spoil the work, but if it sets in a smooth, even manner, it can only be removed from the canvas by means of a solvent.

Shakespeare Illustrated by Doré.—It is said in Paris that M. Gustave Doré, who has already exercised his fertile and picturesque pencil on Dante, Chateaubriand, and Cervantes, is engaged in a series of illustrations of the works of Shakespeare. There is no doubt that M. Doré will find an immense number of passages suitable to his genius, but it is to be hoped, for his own reputation, out of France especially, that he will pay some attention to local characteristics and colouring, and avoid such incongruities as are exhibited in his illustrations of "Atala," in which we find northern firs and tropical palms most unfortunately mingled—though, it is just possible that, in this case, the author and the illustrator may deserve equal blame; and also, that he will attempt to endow the personages of Shakespeare, and more especially the female characters, with general, nay, universal, physiognomical characteristics, avoiding the conventionality which marks so terribly the otherwise admirable delineations of many of his own countrymen.

Manufactures.

Cast-Lead Traps.—Hitherto stink traps have been made by hand, whether of the S form or otherwise, it not having been found practicable until now to cast them, loam cores being too expensive. They were formed by beating up the lead and joining the parts by solder, a process involving time and labour, and therefore expensive, whilst at the same time the roughnesses and corners left in the soldering rendered the article more liable to collect dirt and clog. Messrs. Beard and Dent are now employing an invention of Mr. Lowe, an American, who uses cores of gun-metal or cast-steel, composed of several pieces readily put together and easily withdrawn after the casting is made. Under the old system four traps only could be made in a day by a plumber and a labourer, whilst by the new plan, with two sets of corners, four men can make eighteen such traps in one hour. The advantages are:—1. That the traps are considerably cheaper than hand-made traps. 2. That they are of pure and solid lead, without solder or seam of any kind, and as smooth and clear inside and out as pipe made by hydraulic pressure. 3. That they are of perfect regular substance throughout; and, being composed of one metal, are not subject to injurious expansion from hot water, nor are they liable to be affected by the generation of gases, which almost invariably destroy the ordinary trap.

Cologne International Exhibition.—It has been already announced in these columns that the Cologne Exhibition has been deferred to the 2nd June, in order to give foreign exhibitors the benefit of the conditions of the new tariff, but it is not generally known that the scope of the exhibition is limited to certain classes of objects. The whole is to be classed under four heads:—I. Agriculture. II. Domestic Economy. III. Matters relating to Forest Life and the Chase. IV. Horticulture. These denominations must, however, be taken in the widest sense. In the first place, agriculture includes all matters connected with wine, sugar, distillation, &c.; domestic economy—materials and articles of clothing of all kinds, as well as furniture, glass, and other household necessaries—while vehicles of all kinds will come under the various classes. The management exhibits a determination to make the undertaking successful. There is no charge for space; the railways of France, Belgium, and the Rhenish provinces have announced a reduction of one-half on the tariff for the conveyance of goods to be exhibited, and the charge for conveyance to or from the terminus to the Exhibition is fixed at 50 centimes per 50 kilogrammes (5d. per cwt.), customs declarations and other formalities included; and no duty will be charged unless the machinery or goods are sold. Moreover, in order to aid the sale of the objects exhibited the commission has devoted the sum of 40,000 francs for the purchase of articles which will afterwards be disposed of by means of a lottery. Medals are to be given in all the classes, and three important prizes, in money, the amount of which, however, is not yet made known, for the best steam plough, the best fire pump, and the best locomotive for common roads, respectively.

New kind of Mirror.—The Paris correspondent of the *Chemical News* writes that M. Dode, a provincial chemist, has introduced platinum mirrors, which are greatly admired, and which present this advantage, that the reflecting metal is deposited on the outer surface of the glass, and thus any defect in the latter is concealed. The process, which is patented here, is described as follows:—Chloride of platinum is first made by dissolving the metal in aqua regia, and driving off the excess of acid. The neutral chloride is then dissolved in water, and a certain quantity of oil of lavender is added to the solution. The platinum immediately leaves the aqueous solution and passes to the oil, which holds it in suspension in a finely-divided state. To the oil so charged the inventor adds litharge and borate of lead, and he paints a thin coat of this mixture over the surface of the glass, which is then carried to a proper furnace. At a red heat the litharge and borate of lead are fused and cause the adhesion of the platinum to the softened glass. The process is very expeditious. A single baking, M. Dode states, will furnish 200 metres of glass ready for commerce. It would take fifteen days, he says, to coat the same extent with mercury by the ordinary plan. A considerable reduction in the cost of looking-glass is expectod from the adoption of this process; for any glass, even the common bottle metal, will serve to be coated.

Aniline Black Dye.—French manufacturing chemists and dyers have of late given great attention to the production of a black dye from the aniline source, and M. Charles Lauth has invented a new process, and his black aniline dye has been used at Mulhouse for printing from 15,000 to 20,000 pieces of muslin. The system employed by M. Lauth is to print with matter insoluble in water and acids, but which becomes soluble afterwards on the fabric. In his own words the process is thus described:—"My receipt for black aniline dye consists in printing with chlorate of potash and aniline salt on a preparation of soluble iron or copper, but I give the preference to sulphite of copper. The printed stuff is then exposed to oxidation and afterwards washed, when the black is perfectly fixed." The acid of the aniline salt decomposes the chlorate of potash; the chlorine, or its oxides, transforms the copper into sulphate of copper; and the last-named product aids in the oxidizing process. The advantages claimed for M. Lauth's process are as follows:—The sulphite of copper, being entirely insoluble, has no effect on the roller and scrapers: the colour in its soluble state containing nothing but chlorate of potash and an aniline salt, will remain unchanged for a long period; it is cheap, costing only about 90 centimes a litre (4s. 9d. per gallon English); it fixes easily in a temperature of 20° centigrade (less than 69° Fahrenheit); it may be applied to almost all kinds of work, and, when proper precautions are taken, has no injurious effect whatever on the tissue. The aniline black of M. Lauth is declared to resist not only ordinary but chemical agents, and so to incorporate itself with the fibres of the printed fabric that nothing can afterwards move it.

Commerce.

Tea in Hill Tipperah.—The tea tree has been found in Hill Tipperah by Mr. Civil Assistant W. C. Rossenrode, whilst carrying on the approximate triangulation in advance last season, at a hill called Sabrong, in lat. 23 deg. 2 min. and lon. 91 deg. 48 min. There is another tree in this country, called, in Bengal, the "maritcha," growing up to twenty-five or thirty feet in height, the venation of the leaves of which is the same as that of the tea. The tea tree will grow and thrive wherever the maritcha is found. The clove plant has always been found indigenous on the table-land between Gojalia and Tulamara. Dr. Cleghorn pronounces it a *cinnamonum*. Now that tea is known to thrive in Chittagong and Tipperah, the *Friend of India* sees no reason why, in time, the whole of the low hill ranges which lie between Assam, Burmah, and south-western China, should not be cultivated.

Oil from Tea Seed.—It has lately (says the *Englishman*) been an important question among tea-planters, what to do with the large quantity of tea seed now available. It will, therefore, be an interesting fact for them to learn that a trial was recently made at Calcutta to produce oil from tea-seed. The result would seem to prove that three maunds of tea-seed will yield about one maund of oil. The oil is very similar in appearance to olive-oil. The *modus operandi* is very simple. The seed is first crushed in a crushing machine, and then pressed in another worked horizontally by an Archimedean screw.

TEA IN INDIA.—The *Calcutta Englishman* says:—Perhaps the most interesting feature of the current history of Bengal is the progress in outlying and hitherto uncultivated tracts of country. Foremost among such tracts are Sylhet, Cachar, and Assam. In Sylhet the progress last year has been great beyond all precedent. The first tea garden was laid out in 1857, but English enterprise did not take root in the province till 1860, when the first of the existing plantations was started. In 1862 more than 1,000 acres were already under cultivation, and in 1863 the number had increased, in round numbers, to 2,500. In 1863 the yield was 31,200 lbs. of tea and 526 maunds of seeds, and last year these numbers have suddenly risen to 81,200 lbs. of tea and nearly 1,500 maunds of seed. This increase is made in spite of the greatest scarcity of labour, nearly one-third of the coolies being imported. In this province at least the government seems satisfied that the coolies have no serious grievance to complain of. The labourers are allowed extra remuneration for doing more than their allotted task, and their average earnings, according to the report, amount to five rupees a month each cooly. The wages of such men in a Bengal district do not exceed seven pice a day, or something less than three rupees, counting six days to the week. Applications for 75,000 acres await disposal by the collector. In Cachar the cultivation is on a larger scale. Some of the plantations have been in operation for seven years, and cultivation is in progress in 110 estates, aggregating more than 250,000 acres. At the end of 1863 the capital expended was close on 40 lacs, producing a return of 418,243 lbs. of tea and 1,019 maunds of seed; but during the past year the yield has more than doubled, and the estimated turn-out is 823,380 lbs. of tea with 2,573 maunds of seed. The difficulty in procuring labour is even greater in Cachar than in Sylhet. In the latter nearly one-third is imported, in the former the proportion is fully three-quarters. In Assam nearly 200,000 acres have been taken up, affording employment to 28,000 labourers, and sending about £300,000 worth of tea to England, besides what is consumed in India. From Darjeeling no precise information appears to have been obtained for the year 1864, but the purchasing of estates is going on rapidly. The out-turn during 1863 was close on £100,000. The Ramgurh Tea Company have more than doubled their land under cultivation last year in Chota Nagpore; another company is busy in a range of hills to the south-east of Hazareebaugh, and tea-planting in central India is now a *fait accompli*. The young plantations are said to be vigorous and healthy, and the very large proportion of seed that has germinated proves, more conclusively than any geological report, that the soil is well adapted for tea. Labour is cheap, abundant, and to be found on the spot. Taking this into consideration, Col. Dalton observes that, even if the leaf-producing powers of the plant were only half as great in Central India as in Assam and Cachar, the profits of plantations would be equally good. In Chittagong, too, the soil is reported well adapted for tea and coffee cultivation. During the past financial year several tea planters visited the district and applied for grants. Some difficulty is anticipated in making new allotments, "owing to the rather loose and hap-hazard way in which large tracts of land were, so to speak, given away rent-free for long periods at the settlement of the district." It will be remembered that a sample of Chittagong tea won a medal in the Agricultural Exhibition at Alipore. A small estate has been in cultivation for many years near the Sudder station, and a considerable number of acres has recently been broken up for the plant in the hill tracts. We have not space to-day to enter more fully into the report. The figures given in it are under the truth rather than over it, and they refer only to a single branch of English enterprise in India. We find that in one province this portion of British enterprise has trebled itself during the past official year, and in another has doubled itself. The returns of only two tea-growing districts are given in full, but we believe that the same proportion holds good in all. This single branch, tea-planting, has changed the destiny of whole provinces greater in area than England, and turned vast tracts of unhealthy, unprofitable wastes into revenue-paying and life-supporting land. It has belted our North-Eastern frontier with a ring of gardens, and placed an advance guard of Englishmen between the plains and the hill tribes. But this is not all. It has furnished an accessible and profitable vent for the over-crowded population in Bengal proper, and done much to ameliorate the condition of the labouring classes throughout the whole country.

Colonies.

MANUFACTURES OF NEW SOUTH WALES.—There are 180 mills for grinding and dressing-grain. Of these, 129 are steam mills, 20 are driven by water, 13 are windmills, and 18 are worked by horse-power. Thirty-three of these mills are in the pastoral districts. In the year 1860 the number of mills was 193, since which date the number has continuously declined. The number of establishments or machines which are classed under the head of manufactories or works in the old settled districts is 1,568, of which only 323 are in Sydney, and in the pastoral districts 1,768. But under this heading is included the following miscellaneous assortment. Connected with agriculture:—Tobacco factories, steam bakeries, reaping and threshing machines, chaff-cutters, bone crushers. Connected with the pastoral interest:—Soap and candle works, cloth factories, tanneries, fellmongering, meat preserving, boiling down, wool washing, steam wool pressing. Connected with articles of food and drink:—Distilleries and sugar refineries, rectifying and compounding establishments, breweries, steam coffee mills. Connected with building:—Potteries, brick-making, lime-kilns, and saw-mills. Connected with metals:—Millwrights, iron and brass foundries, type foundries, engineering works. Miscellaneous:—Quartz-crushing machines, stone crushing machines, hat manufactories, rope walks, salt works, dye works, gas works, anchor works, steam slips, patent slips, dry docks, fire engines, steam engines, railways, bark cutters, ice manufactories, steam printing presses, water works, gold-washing machines and ship-building yards. This colony appears to be behind some of the neighbouring colonies in respect of improved agricultural implements, three or four of them having imported steam ploughs. The woollen manufacture in 1863, was only to the extent of 64,650 yards, which was only half that of the preceding year. The manufacture of soap was also below that of the preceding year, though the number of establishments had slightly increased. The manufacture of candles was to the extent of 17,237 cwt. There are thirty-nine boiling-down establishments in the colony, of which ten are in the pastoral districts. At these places there were slaughtered 7,574 sheep and 30,335 head of horned cattle, from which were produced 57,594 cwt. tallow. This was an increased production over the previous year. During each of these two years about a quarter of a million sheep were slaughtered, "But," says a Sydney paper, "sheep are too valuable now to be boiled down. The necessity for stocking all new runs has created a great demand, and everything that can crawl on four legs has a value. But if the multiplication of stock continue at its present rate, and especially if the price of wool should decline, the sheep will find their way again in larger numbers to the boiling pot."

NEW ZEALAND INDUSTRIAL EXHIBITION.—This exhibition was opened at Dunedin on the 12th January. The Governor was not present, and his honour the Superintendent filled his place. The exhibition is stated, considering all circumstances, to be a marvel of success. The natural products and manufactures of the colony are well represented, and the collection affords striking

proofs of the great resources of New Zealand. Owing to the unfortunate detention of the *Ramsay*, in which ship are the Indian and British exhibits, the exhibition is deprived of one of its chief attractions. The obelisk representing the bulk of gold got in Otago is the most prominent object; and opposite it stands the elaborate and beautiful apparatus for the lantern of the Cape Saunders lighthouse. The displays of gold and jewellery, in several cases, attracted much admiration. At the northern end of the hall, in the dividing line between Otago and England, stands the dais which was intended for the governor. At the other end of the hall stands the Wellington-built organ, contributed by Mr. Lewis; and in front of the organ was an orchestra for fifty members of the Philharmonic Society. A line of flags, festooned near the ceiling, extended the length of the building. Above the entrance there was hung a very large piece of carpet-work, the centre of which represents Napoleon III. presenting to Queen Victoria a document bearing the words, "The Treaty of Commerce—a further proof of our friendship." At several points, rich carpeting and other specimens of manufacture were displayed in front of the gallery; and a broad band of crimson cloth stretched round the building, just below the line of the glass forming part of the central roof. The interior of the building is said to have a light appearance, despite the absence of chromatic colouring on the walls and ceiling. In the address of the Royal Commissioners to the Superintendent, they describe the objects of the exhibition as being, "to collect together some of the evidences of the remarkable progress of the colony, which attest the energy of its inhabitants; to place them side by side with the products of other colonies and the parent country; to afford the opportunity of comparing the raw material of the newly occupied country with the finished manufactures of the old; to gratify successful enterprise by an acknowledgment of its merits; and to encourage further exertion by the approval of what has been already done." They go on to say, "that but for the unhappy differences which have for so long time past severed the two great sections of the American Union, very considerable additions from those States would have been made to the collection. The Province of Otago recognises with sentiments of the deepest gratitude the zeal and liberality which have marked the co-operation of other provinces and contributors, but we desire to mention the fact that the building in which the exhibition is contained, has been erected at the sole cost of this province." They draw particular attention "to the collections illustrative of the geology of the colony, both on account of their extent and of the intrinsic value of such collections in their bearing on the development of the resources of a country from the mineral wealth of which so much has already been derived, and so much may be confidently expected." They also contrast with these more material evidences of their resources, the proof of social and intellectual refinement which is to be found in the exhibition of fine arts, one which they believe will be admitted to be extremely creditable to the taste and practical skill in art of so young a colony. His honour the Superintendent, in his reply, addressing the Commissioners, said:—"You have been engaged in a noble as well as an arduous work, and you will receive the reward of your self-sacrificing labours in the knowledge that through their means New Zealand has become entitled to claim a higher place than has yet been allotted to it amongst the colonies of Great Britain. The beneficial effects of this exhibition on the colony may not be immediately appreciable, but you have sown good seed in a fertile soil, and may confidently look for an abundant harvest. Through this exhibition New Zealand will be brought out from its obscurity into a face-to-face meeting with the outer world. Many of its great and varied resources will be exemplified—its vitality and progressive character will be attested, new industries will be created, existing ones revived, public taste and morals will be elevated, and a generous emulation between various provinces and colonies will be promoted."

Obituary.

Auguste Hyacinthe Debay.—France has lost a very able artist by the death of this gentleman, which happened a few days since. M. Debay was both painter and sculptor; three of his pictures are at Versailles, "The Enrolment of the Volunteers in 1792," "The Meeting of Henry the Eighth and Francis the First on the Field of the Cloth of Gold," and "The Battle of Dreux." There is one in the Luxembourg gallery, subject from the story of Lucretia. He also executed, amongst other works, the monument to the memory of the late Archbishop Affre, and a statue of Perrault for the new Louvre. His most celebrated work, however, and certainly that by which he will be most generally remembered in England, is "The First Cradle, Eve with Cain and Abel in her lap," a beautiful marble group, which attracted great attention at the Great Exhibition of 1851. M. Debay obtained the very rare honour of first-class medals, both for painting and sculpture, at the Paris Fine Art Exhibitions, the former in 1831 and the latter in 1855. He was only in his sixty-first year when he died.

Publications Issued.

Traité des Brevets d'Invention. By Augustin Charles Renouard. 8vo. (*Guillaumin and Cie.*, Paris.)—At present, when the law of patents is under consideration, it is necessary to know what are the opinions of enlightened foreigners with respect to this much vexed question, and what results of the patent system have been noted in other countries besides our own. M. Renouard is a Counsellor of the Court of Cassation in Paris, and a member of the French Institute, and in every way he has a strong claim on the attention of both the friends and opponents of the patent system. The work, of which the title is quoted above, is the third edition, augmented and materially altered, of a treatise first published so long ago as 1825, and which has always enjoyed a high reputation. M. Renouard has also published other important works on the rights of authors and artists, and on the principles of civil, commercial, and international rights. The work in question is divided into three parts; the first treating of the theory of legislation with respect to inventions, and of its history in France and in each of the other principal states in the civilised world; the second, detailing and explaining the practice of the law in France; and the third being a collection of the Acts passed in France on the subject, from 1844 to the present time. M. Renouard is a warm supporter of the right of the inventor to protection. He says:—"Respect for the rights acquired by labour is one of the fundamental principles of social order. It would be a fatal error to isolate this from that which is due to property." As regards the mode of exercising that right, and conciliating it with those of the public, M. Renouard says:—"The duty towards society is to prevent the public from losing the invention, which, by the very act of publication, enters into the domain of the public mind." . . . . "The legislation problem consists in finding the proper mode of payment." He discusses the proposed system of public recompense, and that of fixed fees for licences, but rejects them both in favour of the principles which form the foundation of the patent laws of all countries; and he declares it to be his profound conviction that the objections raised against the present law are, when examined in a philosophic spirit, of very little weight when placed in the scale against the rights of the inventor. Those who differ from M. Renouard as respects his conclusions, will find a vast amount of historical matter of great interest in his work, especially in the chapters referring to the ancient Industrial Corporations in France, and to the regulations and privileges appertaining to manufactures and to the condition of the inventor previous to 1791.

MANUAL OF THE TURKISH BATH: HEAT A MODE OF CURE AND A SOURCE OF STRENGTH FOR MEN AND ANIMALS.—Edited by Sir John Fife M.D., senior surgeon to the Newcastle Infirmary. (*John Churchill and Sons.*)—This work contains views and opinions taken from the writings and sayings of both medical and non-medical men in reference to the efficacy of the bath. The editor, in his preface, says, "in the year 1859, having previously satisfied my own mind of the efficacy of this process, I brought it under the consideration of the Pathological Society of Newcastle, and afterwards addressed on the subject the House Committee of the Newcastle Infirmary, who, encouraged by his Grace the Duke of Northumberland, well experienced during his eastern travels in the value of the Turkish bath, entered energetically into the enterprise of constructing such baths for the hospital. The effect of this wise measure has been essentially economical, inasmuch as by shortening considerably the necessary period of confinement within the walls of the hospital, less expense has been incurred in restoring many hundreds of working men to their habits of useful industry. Great must be the value of a process which, in a few minutes, will secure a general diaphoresis, bring the circulation to the extremities, and equalize the arterial action instead of permitting a disordered influence to direct an undue flow upon one tortured part to the comparative deprivation of arterial blood to other and distant structures; a process competent to allay spasm immediately in many cases which might resist all other diaphoretics, or exhibit their effects only in gastric and intestinal irritation." The work is divided into two parts; Part I. treats of the action of the bath on man, and commences with a dialogue, in which Messrs. Erasmus Wilson, Witt, and Urquhart took part, and in which the question of "Heat, how useful to man and how used by him," was discussed; written from short-hand notes. This is followed by a second dialogue, being a conversation between Mr. Urquhart and the members of the London Medical Society at Rickmansworth. Next comes a paper read by Mr. Urquhart before the Society of Arts, "On the Art of Constructing the Turkish Bath;" then a lecture by Mr. Urquhart, "Why Does Man Perspire?" and articles under the following heads:—"Consumption Produced by Habits, not Climate;" "Treatment of Consumption by the Turkish Bath," by Dr. Leared, &c.; with papers referring to the treatment of cancer, leprosy, hydrophobia, and apoplexy; cure of cataract; the construction of a bath with radiating heat for invalids, comprised in a correspondence with Sir John Fife, "The introduction of the bath into lunatic asylums and naval and military hospitals, with Dr. Robertson's experience at the Sussex Lunatic Asylum," and a paper on "Heat rays, sun rays, electricity and vital power," concludes Part I. To all these papers a large amount of notes is added. Part II. relates to the action of the bath as regards animals, and consists of two papers, one entitled "The Bath in the Farm," which refers to the training of horses, the treatment of domestic animals, and Admiral de Rous's views "On the Bath for Horses;" and the other called "Four Years' Experience of the Bath on an Irish Farm," by J. E. Scriven, Esq. An appendix concludes the work. There is a vast deal of useful information connected with the bath to be found in this small volume, and much that is worthy of impartial consideration. In statements by non-professional persons, it is necessary, says the editor "to guard against hasty conclusions on the one hand; or, on the other hand, the rejection of statements that may seem at variance with the therapeutic science of men experienced in the value and justly confident in the indications which therapeutics afford."

L'ANCIENNE ACADEMIE DES SCIENCES. By Monsieur L. F. Alfred Maury. 8vo. (*Didier and Co.*, Paris.) This is a companion volume to one by the same author, M. Maury, of the French Institute, Professor of History and Morals at the College of France, on the Academy of Inscriptions and Belles-Lettres. Like the latter, this gives a detailed history of the rise and progress of the academy of which it treats, but, in a practical point of view, it is of far greater importance, for it presents also a history of the march of science itself, while the Academy of Belles-Lettres could not furnish any array of positive facts for such a history of subjects. M. Maury says, and with justice, that didactic treatises seldom afford sufficient information upon the various steps which have been taken in science, and of the successes and failures which have alternated with each other; and thus the man of science, and more especially the student, is not furnished with those data which might prevent his falling into the very errors which his predecessors have discovered and often surmounted. Again, M. Maury is a devoted admirer of science, and places it far before literature, or rather before works of imagination, for he says:—"Science requires a logical capacity, a power of concentration and perseverance, a genius for abstraction and generalization, which the purely literary man does not want." M. Maury carries his work down to the end of the last century only, for, he says, in the first place, the scientific epoch which then opened is not yet closed; and, secondly, that the science of the nineteenth century has assumed such vast dimensions, and ramified in such an extraordinary manner, that no one man is capable of grasping the threads of such a complicated skein. The progress of science in all its branches, and in other countries as well as in France, is traced with learned care and explained in a lucid and highly-interesting manner. Amongst the subjects which are treated with the greatest fullness are astronomy, the applications of mathematics to physical science, natural history, and chemistry, but nothing is omitted which can explain the growth of each branch of the scientific tree, and the connection which exists between them. M. Maury exhibits complete impartiality in estimating the labours of the philosophers of other nations, and Englishmen will have no cause to complain of his appreciation of their countrymen's achievements.

METEOROLOGICAL DIAGRAM, showing the daily elements throughout the year 1864. By C. O. F. Cator, M.A. (*E. Stanford*, Charing-cross.) This diagram exhibits, by means of curves, the daily barometric pressure, temperature, direction of the wind, rainfall, and weekly number of deaths in London. The Greenwich mean temperature for each day as well as that of London is given.

Notes.

THE PAINTER'S COMPANY'S EXHIBITION OF GRAINING, DECORATION, &c.—The Company have issued a notice that as this Exhibition, after five years' existence, has not increased either in the quality or the number of the specimens presented for competition, it is concluded that an annual demand on the trade for specimens is too frequent, and, therefore, the Company have resolved in future to hold the exhibition once in two or three years, according as the wishes of the trade may be expressed. In order to ascertain the general feeling of those interested, and, if possible, to excite a more energetic response on the part both of masters and journeymen than has hitherto been manifested, the Master, Wardens, and Court solicit communications on the subject, which will receive the utmost attention, and which will regulate the future proceedings in relation to the exhibition. Under these circumstances, there will not be an exhibition this year (1865) at the Hall; but one will be held next year if there is an adequate response from the trade, both masters and journeymen.

WATER SUPPLY OF PARIS.—The great works for supplying the houses and city of Paris with water are being pushed forward with remarkable activity. In the *Journal* of the Society, of March 10th, some account was given of the extensive reservoirs at Ménilmontant and Belleville, and of the aqueduct for bringing the waters of the

Dhuis to the metropolis; a few more particulars may now be added. The other day, the loungers in the neighbourhood of the tower of Saint Jacques de la Boucherie, were astonished at the appearance of a number of cast iron pipes, measuring more than fifty-four inches in diameter; these tubes weigh about a ton each, and are to be laid in the tunnels of the new sewers, and will form a portion of the Dhuis aqueduct. A steam-engine of fifteen horse power will raise the water from the reservoir of Ménilmontant to that of Belleville, and the latter, from its elevated position, will supply the highest portions of the city, which at present depend entirely on manual labour for their water. The new sources now being brought into use are calculated to bring to Paris 200,000 cubic metres of water in twenty-four hours; one fifth of this quantity is to come through the Dhuis aqueduct. In order to bring the waters of the Marne to Ménilmontant, the authorities of the city of Paris have purchased the waters and usine of St. Maur, which were the property of Messieurs Darblay and Béranger, the great millers; turbines of about 400 horse-power are now being up set at St. Maur for this service, and two conduits of cast iron are now being laid down, to connect the turbines with the reservoir of Ménilmontant; each of these conduits is nearly nine thousand yards in length.

City Horticulture.—According to the *Building News* Mr. Morris, the architect, has proposed to the authorities to try terrace gardening in Trafalgar-square. He advocates the formation of a new terrace to the south of the Nelson column, the central space being diversified by the introduction of suitable plants, shrubs, and low-growing trees. Portable trees, such as adorn the walks of the Tuileries, would be placed on the Pall-mall terrace, as well as within the enclosed areas of the National Gallery. The effect, observes our contemporary, would be unlike anything which London now offers, and the works of architecture and sculpture would be relieved and harmonized by the presence of horticulture.—The first of a series of city flower shows was recently held, at Albion Hall, which is situated within a stone's throw of the Bank of England by way of Moorgate-street.—The following hints on window gardening for the working classes are by Mr. Walter H. Bosanquet:—*The Flower Pot.*—Do not paint the outside of the flower pot, but keep it as clean as possible. Before making use of a flower pot, if it be new, dip it into clean water; if it be an old one wash it perfectly clean inside and outside. Before filling it with mould, cover the hole at the bottom with a piece of broken pot, and over that, place two or three layers of small stones. Put the coarse mould at the bottom and the fine mould at the top. *The Seed.*—Do not sow the seeds too deep. Sow large seeds, such as sweet peas and nasturtiums, one inch deep, but let small seeds, such as mignonette, be only slightly covered. Until the seeds come up, water them as gently as possible, or cover the mould with wet moss. *Annuals.*—These are raised from seed and only live one year. The sorts called "hardy" and "half hardy" may be raised as window plants. Sow the seeds at the end of March or the beginning of April, and keep those sorts which are called "half-hardy" in-doors until the warm weather comes. Thin the young plants by degrees, but do not leave too many, or they will not have room to grow. *Watering.*—Do not give any water until the mould feels dry, but then water thoroughly, and throw away the water which runs through into the saucer, unless the weather is very warm and dry. Water gently, so as not to wash a hole in the mould or uncover the roots. Use rain water as often as possible, or water which has been long exposed to the air. In winter only give sufficient water and warmth to keep the plant alive. *Light.*—Keep the plants close to the window and turn them as often as the leaves get drawn in one direction. Shade the flower pot from the hot sun, but not the plant, unless the heat is very great. After dark keep the plants, if possible, in a dark, cool room. *Air.*—Give the plants as much fresh air as possible through the window if the air is not very cold. Do not leave door and window open at the same time. Plants which have been exposed to the fresh air become much more hardy than those which are confined in warm, close rooms. *Cleanliness.*—This is equally important for the well-being of plants and men. Whenever the leaves and stalks get dusty or dirty, wash them with a sponge and lukewarm water. Remove your plants from your rooms while you are dusting or cleaning them. Expose your plants as often as possible to warm soft showers, in order to wash and refresh them. *General Directions.*—At night place the plants on or near the ground, or leave the window slightly open. When the surface of the mould becomes hard stir it up carefully so as not to disturb the roots. Pick off all dead leaves and stalks. Do not buy greenhouse plants, but hardy plants, which are suitable for planting out of doors.

New Thermo-Electric Pile.—M. Edmond Becquerel, of Paris, has arranged a new thermo-electric pile, which is said to exhibit great activity. In place of bismuth and copper, he makes use of sulphite of copper, cast at a heat a little above its point of fusion, and metallic copper. One of these discs of sulphite of copper, placed between two of copper, forms an element; and ten of these elements combined, having one extremity plunged in a sand bath maintained at the temperature of 212° Fahrenheit, and the other in cold water, form a pile which is said to be powerful enough to work a telegraphic apparatus.

MEETINGS FOR THE ENSUING WEEK.

Mon. ...Antiquaries, 2. Annual Meeting.
Philosophical Club, 6. Annual Meeting.
R. Geographical, 8½. 1. Mr. Lawrence Oliphant, "On the Bayanos River, in the Isthmus of Panama." 2. Mr. R. Cross, "A Journey from the foot of Chimborazo to Bogota, across the Central Andes."
British Architects, 8.
Actuaries, 7. 1. Mr. G. W. Berridge, "On the Graduation of a Table of Mortality." 2. Mr. M. N. Adler, "On Government Insurance Rates and Regulations."
Royal United Service Inst., 8½. Staff Commander Fred. J. O. Evans, R.N., F.R.S., "The Magnetism of Iron and Iron-clad Ships."

Tues. ...Society of Arts, 8. Cantor Lectures. Dr. F. Crace Calvert, "On some of the Most Important Chemical Discoveries made within the last two years." (Lecture III.)
Medical and Chirurgical, 8½.
Civil Engineers, 8. 1. Discussion on Capt. Tyler's paper "On the Festiniog Railway." 2. Mr. Callcott Reilly, "On Uniform Stress in Girder Work."
Zoological, 8½.
Ethnological, 8. Rev. James Brodie, "Observations on the Peculiarities of National Pronunciation, as a means of Tracing the Origin and History of Nations."
Royal Inst., 4. Prof. Frankland, "On Organic Chemistry."

Wed. ...Society of Arts, 8. Mr. F. A. Paget, "On the Wear and Tear of Steam Boilers."
Geological, 8.
London Inst., 12 noon. Annual Meeting.
R. Society of Literature, 4. Annual Meeting.
Archæological Assoc., 8½.

Thurs...Royal, 8½.
R. Society Club, 6.
Royal Inst., 4. Prof. Frankland, "On Organic Chemistry."

Fri.....Royal Inst., 8. Professor Lyon Playfair, "On the Diet of Man, &c."
R. United Service Inst., 3. Colonel R. A. Shafto Adair, "Classification of the Causes of War."

Sat.....Royal Inst., 4. Prof. Bain, "On the Physical Accompaniments of Mind."

PARLIAMENTARY PAPERS.

SESSIONAL PRINTED PAPERS.

Par. Numb. *Delivered on 21st March*, 1865.

3 (281 to 291). Railway and Canal, &c., Bills—Board of Trade Reports, Parts 281 to 291.
116. Royal Courts (Jersey)—Returns.
120. Banda and Kirwee Booty—Further Correspondence.
123. Regimental Quartermasters—Report.
141. Public House Closing Act—Return (a corrected Copy).
146. Police Stations—Correspondence.

150. Poor Relief—Return.
North America (No. 2) (1865)—Papers respecting the termination of the Reciprocity Treaty of June 5, 1854.
Belfast Borough—Report of Inquiry Commissioners as to Magisterial and Police Jurisdiction, &c.

Delivered on 28th March, 1865.

87. Bill—Procurators (Scotland).
66 (v). Railway and Canal Bills—Sixth Report of the General Committee.
128. Army Pensions—Warrant.
133. Woods, Forests, and Land Revenues—Abstract Accounts.
140. Mines—Return.
Ionian Islands—Correspondence respecting Pensions to British Subjects.

Delivered on 30th March, 1865.

94. Bill—General Post Office (Additional Site).
65 (v). Committee of Selection—Sixth Report of the Select Committee.
167. Epsom Common Inclosure—Further Report.
136. Syrup, &c (Breweries)—Correspondence.
144. Bankruptcy Act—Report from the Select Committee.

Delivered on 31st March, 1865.

95. Bill—Tories, Robbers, and Rapparees.
113. Valuation of Land and Heritages (Scotland)—Returns.
144. Bankruptcy Act—Reports, Proceedings, and Appendix.
156. Navy ("Royal Sovereign," &c.)—Return.
177. Metropolitan Sewage and Essex Reclamation Bill—Special Report of Select Committee.

Delivered on 1st and 3rd April, 1865.

91. Bills—Prisons (Scotland) Act Amendment.
96. ,, Pilotage Order Confirmation (amended by the Select Committee, and on Re-commitment).
52 (II). Trade and Navigation Accounts (28th February, 1865).
66 (VI). Railway and Canal Bills—Seventh Report of the General Committee.
110. Revenue, Expenditure, &c.—Returns.
132. (1). Park Lane and Piccadilly Thoroughfare—Plans.
157. Surrey and Sussex, &c., Roads—Return.
164. St. Benet, Gracechurch Street, &c., Benefices—Minutes, Papers, &c.

Patents.

From Commissioners of Patents Journal, April 14th.

GRANTS OF PROVISIONAL PROTECTION.

Air, engines worked by heated—905—J. Pinchbeck.
Bags, securing the frame of travelling—816—L. A. Leins.
Barrels, preventing the leakage of—913—A. V. Newton.
Bleaching, treating the waste liquids obtained in—797—H. Potter.
Boats, apparatus for lowering ships'—890—A. Chaplin.
Boilers, steam—685—E. B. Wilson and J. Howden.
Bottles, stoppers for—814—C. H. Crowe.
Boots and shoes—784—D. Gourley.
Bread, apparatus for cutting—792—W. Berry.
Bricks, manufacture of—939—A. and A. Lockwood, jun.
Bridges, construction of—888—F. A. Leigh.
Cattle, apparatus for preparing food for—927—R. Willacy.
Chimnies, preventing smoky—911—B. Greenwood.
Cigars, mouth piece for—770—T. Oliver and J. W. Musto.
Cloth, apparatus for manufacture of—821—J. Lees and M. Mellor.
Cotton, mules for spinning—919—W. Mayall, J. Knott, and W. Dennis.
Elixir, febrifuge and digestive—874—A. D. Gascon.
Fabrics, apparatus for printing—870—J. Miller and J. Laing.
Fabrics, weaving ornamental—810—J. Macaulay and R. Watson.
Felloes, machine for dressing—794—H. S. Jacobs.
Fire-arms—790—R. J. Gatlin.
Fire-arms—800—A. P. Tronchon.
Floor cloth, machinery for manufacture of—768—J. H. Kidd and J. C. Mather.
Forging machines—882—J. Wright.
Gas burners—876—F. A. Mocquard.
Gas meters—917—J. Bathgate.
Glass, ornamental articles made of—868—J. Williams.
Gun locks—838—D. Arnold
Hammers, atmospheric—953—J. Vaughan.
Hats, felt—941—C. Vero.
Horses, apparatus for grooming—869—J. Norris, jun.
Ink, manufacture of—836—W. E. Newton.
Iron, manufacture of sheet—409—W. E. Newton.
Iron, treatment of certain products obtained in the smelting of—580—T. Horton and D. S. Price.
Iron, manufacture of balls of—957—J. Player.
Iron, reducing and melting—899—W. Brookes.
Lace, manufacture of—971—F. R. Enson.
Links, fastenings for sleeve links—947—H. Jenkins.
Liquids, apparatus for refrigerating—691—J. Henderson.
Looms, motion for—759—E. Pilling and J. Harper.
Machines, apparatus for feeding printing—812—E. Field and F. Wise.
Machines, sewing—830—A. Baillot.
Machinery, cork cutting—638—W. Clark.
Matters, treating fatty—892—S. Childs, jun.
Nails, machinery for cutting—886—R. C. Robinson.
Oils, apparatus for distilling—727—W. E. Newton.
Ores, apparatus for washing—963—H. Simon.
Paper, utilization of materials for manufacture of—703—J. Webb.
Petroleum, casks for storing—834—J. B. Brown.
Photographs apparatus for mounting—915—J. H. Smith.
Photographic productions, ascertaining the presence of fixing agents in—677—T. Reissig.
Pictures, photographic—618—E. Pettit.
Pianofortes—965—B. Johnson.
Points and switches, railway—844—H. C. Hurry.
Power, obtaining motive—840—V. Baker.
Power, apparatus for hand or steam—18—G. Hodgson and J. Pitt.
Pump—314—W. Clark.
Pumps—943—C. D. Young.
Pumps, force—951—R. Baynes.
Railways, construction of rails for—832—W. Loeder.
Railways, street—923—R. A. Brooman.
Railway trains, communication between passengers and guard of—847—A. I. L. Gordon.
Railway hoists, propelling waggons in connection with—895—G. Greenish.
Railway trains, passage of the guard from one end to the other of—866—J. C. Thompson and J. J. M. Green.
Reflectors, apparatus for holding lamp—704—W. Clark.
Rice, treatment of—642—J. H. Johnson.
Safes, fastenings employed in metallic—903—W. Millner and D. R. Ratcliff.
Sealing wax, apparatus for melting—931—W. Bunger.
Spinning, mules for—850—J. Todd.
Spittoons—852—J. H. Johnson.
Steam, motive power by the aid of—949—W. Brookes.
Steel, hardening and tempering—880—E. Savage.
Steel, rolling or forging—925—W. Gray.
Smoke, furnaces for consumption of—862—C. Matthews and J. Fereday.
Silk, apparatus for winding—921—W. Kilbey.
Stoves, &c.—826—J. C. Morgan.
Substances, expressing liquids from pulpy—955—W. E. Newton.
Valves—754—W. Roberts.
Ventilators, hat—961—R. Stanle.
Weaving, looms for—824—G. H. and J. A. Castree.
Weaving, looms for—907—L. Bridge.
Wool separating—511—S. Saville.
Worsted carding—820—H. Oakes.
Yards, machinery for winding—901—A. Turner.

PATENTS SEALED.

2526. R. A. Brooman.
2529. J. T. Cook.
2532. W. E. Gedge.
2533. W. R. Sykes.
2534. A. Hippius.
2538. R. Wright.
2542. W. H. Kelsey.
2554. E. Tomlinson and J. Jones.
2557. C. T. Judkins and W. L. Gosling.
2558. T. Corbett.
2560. J. Cassell.
2562. M. Henry.
2564. J. Maurice.
2570. J. Hart.
2580. W. and F. W. Gilbert.
2581. W. Taylor, H. Harrison, & G. Brown.
2583. W. Buxton.
2586. A. Clavel.
2589. F. Walters.
2605. L. Paviola.
2611. T. Allcock.
2629. G. Schorb.
2634. W. Clark.
8644. W. Clark.
2649. J. Hall, W. Dunkerley, & S. Schofield.
2676. J. Hartshorn & J. Gadsby.
2686. G. H. Devereux.
2699. T. Ivory.
2707. G. Ashcroft.
2745. H. V. Scattergood.
2760. A. V. Newton.
2761. C. T. Burgess.
2809. F. Fearon.
2983. W. J. Matthews.
3215. W. E. Gedge.
257. W. Foster.
330. A. A. Hulot.
364. J. Chubb.
375. A. Krupp.
381. G. Coles, J. A. Jaques, and J. A. Fanshawe.
422. G. Homfray.

From Commissioners of Patents Journal, April 18th.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

1043. W. E. Gedge.
1150. H. Lumley.
1101. J. Mackay.
1127. C. D. Abel.
1228. J. G. N. Alleyne.
1233. A. Boyle and T. Warwick.
1063. J. F. Spencer.
1070. J. Dargue.
1084. A. V. Newton.
1090. T. W. Gray.
1146. W. Rose.
1168. S. S. Putnam.
1081. F. A. Le Mat and C. F. Girard.
1085. G. Bedson.
1124. G. T. Bousfield.
1164. J. C. Amos.
1129. R. A. Brooman.
1202. R. Mushet.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

789. T. Kay.
883. J. Chatterton.
845. J. H. Johnson.

Registered Designs.

Odorator—March 24—4704—Gustavus Boehm, 3, Aldermanbury, City, E.C.
Stove Grate—April 11—4705—H. Crichley and Co., Bordesley, Birmingham.
Table Fastener—April 13—4706—W. Tonks and Sons, Birmingham.
Mediæval Reclining Chair—April 15—4707—C. Bevan, 66, Margaret-street, Cavendish-square.